WE CLAIM:

1. A diamond layer of single crystal CVD diamond which is coloured and which has a thickness greater than 1 mm.

2. A diamond layer according to claim 1 which has a fancy colour.

3. A diamond layer according to claim 2 wherein the colour is a fancy colour with a dominant brown component.

4. A diamond layer according to claim 1 wherein the colour is a fancy orangey brown, orange-brown, pinkish brown, pink-brown or dark brown.

5. A diamond layer according to claim 1 wherein the hue angle is less than 80 degrees.

6. A diamond layer according to claim 1 wherein the hue angle is less than 75 degrees.

7. A diamond layer according to claim 1 wherein the hue angle is less than 70 degrees.

8. A diamond layer according to claim 1 which has a thickness greater than 2 mm.

9. A diamond layer according to claim 1 which has a thickness greater than 3 mm.

10. A layer of single crystal CVD diamond according to claim 1 which has one or more of the characteristics (i), (ii), (iii) observable in the majority volume of the layer, which comprises at least 55 percent of the whole volume of the layer:

(i) The majority volume of the layer contains one or more defect and impurity related colour centres that contribute to the absorption spectrum of the diamond as set out in the absorption coefficient column below:

Designation	Starts	Ends	Peak	Absorption coefficient (at peak)
270 nm	220 nm	325 nm	270 nm	0.1 cm^{-1} – 30 cm^{-1}
350 nm band	270 nm	450 nm	350 nm	0.3 cm^{-1} – 20 cm^{-1}
510 nm band	420 nm	640 nm	510 nm	0.1 cm^{-1} – 10 cm^{-1}
570/637 nm	500 nm	640 nm	570 nm	0.1 cm^{-1} – 5 cm^{-1}
Designation	Form of Curve			Absorption Coefficient
Ramp	Rising background of form Absorption coefficient (cm^{-1}) = C x λ^{-3} (C=constant, λ in μm)			Contribution at 510 nm is:< 3 cm^{-1}

(ii) The majority volume of the layer contains defect and impurity related centres that contribute to the luminescence spectrum as set out in the Normalised luminescence intensity column of the table below, when measured in the manner described herein using Ar ion 514 nm laser excitation at 77 K:

Designation	Starts	Ends	Peak	Normalised luminescence intensity of zero phonon line at 77 K
575 nm	570 nm	680 nm	575 nm	0.02 – 80
637 nm	635 nm	800 nm	637 nm	0.01 – 300

(iii) The majority volume of the CVD diamond layer exhibits a ratio of normalised 637 nm/575 nm luminescence, measured in the manner described herein, which is in the range 0.2 – 10.

11. A diamond layer according to claim 10 wherein the majority volume comprises at least 80 percent of the whole volume of the layer.

12. A diamond layer according to claim 10 wherein the majority volume comprises at least 95 percent of the whole volume of the layer.

13. A diamond layer according to claim 10 wherein the majority volume of the layer is formed from a single growth sector.

14. A diamond layer according to claim 10 wherein the colour centre that contributes to the absorption spectrum of a diamond at 270 nm has the characteristics:

Designation	Starts	Ends	Peak	Absorption coefficient (at peak)
270 nm	235 nm	325 nm	270 nm	0.4 cm^{-1} – 10 cm^{-1}

15. A diamond layer according to claim 10 wherein the colour centre that contributes to the absorption spectrum of a diamond at 270 nm has the characteristics:

Designation	Starts	Ends	Peak	Absorption coefficient (at peak)
270 nm	235 nm	325 nm	270 nm	0.8 cm^{-1} – 6 cm^{-1}

16. A diamond layer according to claim 10 wherein the colour centre that contributes to the absorption spectrum of a diamond at 350 nm has the characteristics:

Designation	Starts	Ends	Peak	Absorption coefficient (at peak)
350 nm band	270 nm	450 nm	350 nm	1.0 cm^{-1} – 8 cm^{-1}

17. A diamond layer according to claim 10 wherein the colour centre that contributes to the absorption spectrum of a diamond at 350 nm has the characteristics:

Designation	Starts	Ends	Peak	Absorption coefficient (at peak)
350 nm band	270 nm	450 nm	350 nm	1.5 cm^{-1} – 6 cm^{-1}

18. A diamond layer according to claim 10 wherein the colour centre that contributes to the absorption spectrum of a diamond at 510 nm has the characteristics:

Designation	Starts	Ends	Peak	Absorption coefficient (at peak)
510 nm band	420 nm	640 nm	510 nm	0.2 cm^{-1} – 4 cm^{-1}

19. A diamond layer according to claim 10 wherein the colour centre that contributes to the absorption spectrum of a diamond at 510 nm has the characteristics:

Designation	Starts	Ends	Peak	Absorption coefficient (at peak)
510 nm band	420 nm	640 nm	510 nm	0.4 cm^{-1} – 2 cm^{-1}

20. A diamond layer according to claim 10 wherein the colour centre that contributes to the absorption spectrum of a diamond at 570/637 nm has the characteristics:

Designation	Starts	Ends	Peak	Absorption coefficient (at peak)
570/637 nm	500 nm	640 nm	570 nm	0.3 cm^{-1} – 3 cm^{-1}

21. A diamond layer according to claim 10 wherein the colour centre that contributes to the absorption spectrum of a diamond at 570/637 nm has the characteristics:

Designation	Starts	Ends	Peak	Absorption coefficient (at peak)
570/637 nm	500 nm	640 nm	570 nm	0.3 cm^{-1} – 1.5 cm^{-1}

22. A diamond layer according to claim 10 wherein the ramp has the characteristics:

Designation	Form of Curve	Absorption coefficient (at peak)
Ramp	Rising background of form Absorption coefficient (cm^{-1}) = C x λ^{-3} (C=constant, λ in μm)	Contribution at 510 nm is: < 1.5 cm^{-1}

23. A diamond layer according to claim 10 wherein the ramp has the characteristics:

Designation	Form of Curve	Absorption coefficient (at peak)
Ramp	Rising background of form Absorption coefficient (cm^{-1}) = C x λ^{-3} (C=constant, λ in μm)	Contribution at 510 nm is: < 0.8 cm^{-1}

24. A diamond layer according to claim 10 wherein the colour centre that contributes to the luminescence spectrum of a diamond at 575 nm has the characteristics:

Designation	Starts	Ends	Peak	Normalised luminescence intensity of zero phonon line at 77 K
575 nm	570 nm	680 nm	575 nm	0.05 – 60

25. A diamond layer according to claim 10 wherein the colour centre that contributes to the luminescence spectrum of a diamond at 575 nm has the characteristics:

Designation	Starts	Ends	Peak	Normalised luminescence intensity of zero phonon line at 77 K
575 nm	570 nm	680 nm	575 nm	0.2 – 40

26. A diamond layer according to claim 10 wherein the colour centre that contributes to the luminescence spectrum of a diamond at 637 nm has the characteristics:

Designation	Starts	Ends	Peak	Normalised luminescence intensity of zero phonon line at 77 K
637 nm	635 nm	800 nm	637 nm	0.02 – 200

27. A diamond layer according to claim 10 wherein the colour centre that contributes to the luminescence spectrum of a diamond at 637 nm has the characteristics:

Designation	Starts	Ends	Peak	Normalised luminescence intensity of zero phonon line at 77K
637 nm	635 nm	800 nm	637 nm	0.03 – 100

28. A diamond layer according to claim 10 wherein the ratio of normalised 637 nm/575 nm luminescence is in the range 0.5 to 8.

29. A diamond layer according to claim 10 wherein the ratio of normalised 637 nm/575 nm luminescence is in the range 2 to 5.

30. A layer of single crystal diamond which is coloured and which has, observable in the majority volume of the layer wherein the majority volume comprises at least 55 percent of the whole volume of the layer, a low ramp as set out in the table below:

Designation	Form of Curve	Absorption Coefficient
Ramp	Rising background of form Absorption coefficient (cm^{-1}) = $C \times \lambda^{-3}$ (C=constant, λ in μm)	Contribution at 510 nm is: $< 3\ cm^{-1}$

and wherein the majority volume contains one or more of the defect and impurity related colour centres that contribute to the absorption spectrum of diamond as set out in the absorption coefficient column of the table below:

Designation	Starts	Ends	Peak	Absorption coefficient (at peak)
270 nm	220 nm	325 nm	270 nm	0.1 cm^{-1} – 30 cm^{-1}
350 nm band	270 nm	450 nm	350 nm +/- 10 nm	0.3 cm^{-1} – 20 cm^{-1}
510 nm band	420 nm	640 nm	510 nm +/- 50 nm	0.1 cm^{-1} – 10 cm^{-1}
570/637 nm	500 nm	640 nm	570 nm	0.1 cm^{-1} – 5 cm^{-1}

31. A method of producing a coloured single crystal diamond layer includes the steps of providing a diamond substrate having a surface which is substantially free of crystal defects, providing a source of gas, dissociating the source gas to produce a synthesis atmosphere which contains 0,5 to 500 ppm nitrogen, calculated as molecular nitrogen, and allowing homoepitaxial diamond growth on the surface which is substantially free of crystal defects.

32. A method according to claim 31 wherein the synthesis atmosphere contains 1 to 100 ppm nitrogen, calculated as molecular nitrogen.

33. A method according to claim 31 wherein the synthesis atmosphere contains nitrogen in an amount suitable to enhance the size of the {100} growth sector and reduce the size of competing growth sectors.

34. A method according to claim 31 wherein the density of defects is such of surface etch features related to defects is below $5 \times 10^3/mm^2$.

35. A method according to claim 31 wherein the density of defects is such that the density of surface etch features related to defects is below $10^2/mm^2$.

36. A method according to claim 31 wherein the surface or surfaces of the diamond substrate on which CVD diamond growth occurs is selected from the {100}, {110}, {113} and {111} surfaces.

37. A diamond layer produced by a method according to claim 31.

38. A gemstone produced from a diamond layer according to claim 1 or claim 37.

39. A gemstone according to claim 38 with a quality grading of SI1 or better.

40. A gemstone according to claim 38 with a quality grading of VS1 or better.